

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Yasuhiro YOSHIOKA et al.

Application No.: 10/643,221

Confirmation No.: 003448

Filed: August 19, 2003

Art Unit: 1752

For: PHOTOTHERMOGRAPHIC MATERIAL

Examiner: T. Chea

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Hisashi MIKOSHIBA, a Japanese citizen, having a post office address of c/o FUJIFILM Corporation, No. 210, Nakanuma Minami-ashigara-shi, Kanagawa 250-0193 Japan, hereby declare and state that I received a Master's Degree from Tokyo Institute of Technology, Graduate School of Science and Engineering, Department of Chemical Engineering in March of 1987. I was employed by Fuji Photo Film Co., Ltd. (now FUJIFILM Corporation) in April of 1987 and since that time I have been principally engaged in research and development of image formation, particularly development of materials and synthesis of organic compounds in the research laboratories of said company.

I am fully knowledgeable of the disclosure of the above-identified application and the field of art of the present invention. I have read and understand the Office Action dated October 10, 2006, and the Advisory Action dated April 27, 2007 and the references cited therein, Miura et al. (U.S. Patent 6,248,512) and Bojora et al. (U.S. Patent 3,667,959).

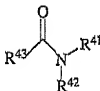
1) Miura et al. and the present invention of claims 1-5, 10 and 11

Claim 1 is an independent claim and claims 2-5, 10 and 11 depend from claim 1.

Currently, claim 1 recites as follows:

1. A photothermographic material comprising, on one side of a support, a photosensitive silver halide, a non-photosensitive silver salt of an organic acid, a reducing agent for silver ions and a binder, which is characterized by containing at least one phenol compound as the reducing agent and

at least one compound having a hydrogen bond formation rate constant K_f that is 20-4000, and which is represented by the following formula (IV):



(IV)

wherein:

and in the formula (IV), R⁴¹ and R⁴² independently represent an alkyl group, an aryl group or a heterocyclic group, R⁴³ represents an alkyl group, an aryl group, a heterocyclic group or N-(R⁴⁴)(R⁴⁵) where R⁴⁴ and R⁴⁵ independently represent an alkyl group, an aryl group or a heterocyclic group,

wherein R⁴¹ and R⁴² which independently represent an alkyl group, an aryl group or a heterocyclic group, may be taken together to form a ring, and

when R⁴³ represents -N(R⁴⁴)(R⁴⁵), then

R⁴⁴ and R⁴⁵, each independently representing an alkyl group, an aryl group or a heterocyclic group, may be taken together to form a ring or

at least one of R⁴¹ and R⁴², each independently representing an alkyl group, an aryl group or a heterocyclic group, and at least one of R⁴⁴ and R⁴⁵, each independently representing an alkyl group, an aryl group or a heterocyclic group, may be taken together to form a ring.

It is my opinion that Miura et al. fail to teach or fairly suggest the compounds of Formula (IV) of claim 1. Furthermore, it is my opinion that the compounds of Miura et al. do not satisfy the requirement of claim 1 that the compounds have a hydrogen bond formation rate constant K_f of 20-4000.

The Examiner alleges on page 3 of the October 10, 2006 Office Action that compounds A-29 and A-36 of Miura et al. fall within the scope of Formula (IV) of instant claim 1. This is

absolutely wrong. Compounds A-29 and A-36 are as follows:



A29



A36

The Examiner will note that Compounds A-29 and A-36 of Miura et al. require that a halogen is bonded to the nitrogen in the amide group.

This is in distinction to instant formula (IV), wherein the groups of R^{41} and R^{42} which bond to the nitrogen are not halogen. When R^{43} is $-N(R^{44})(R^{45})$, R^{44} and R^{45} are not halogen. Thus, the structure of Miura et al. is represented by $-C(=O)-N$ -halogen whereas the structure of the formula (IV) is represented by $-C(=O)-N$ -(alkyl, aryl or heterocyclic group). Accordingly, Compounds A-29 and A-36 are not encompassed by the present claims.

Furthermore, Compounds A-29 and A-36 do not satisfy the requirement of instant claim 1 that the compounds have a hydrogen bond formation rate constant K_f of 20-4000. This is explained in further detail below.

The Examiner further alleges on page 3 of the October 10, 2006 Office Action that compounds B-1, B-2, B-3, B-5, B-9 to 12 of Miura et al, also fall within the scope of Claim 1 in the present application. This is also wrong.

In addition, none of compounds B-1, B-2, B-3, B-5, B-9 to 12 nor compounds A-29 and

A-36 satisfies the K_f condition of Claim 1.

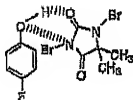
K_f is the hydrogen bond formation rate constant and is used as an index of hydrogen bond formation. It is fully explained in R.W. Taft et al., *J. Am. Chem. Soc.*, 91, 4794-4800 (1969), a copy of which was attached to the April 9, 2007 Amendment. (See the paragraph bridging pages 13 and 14 of the specification of the present application.)

K_f is the equilibrium constant in a reaction where a hydrogen bond is formed between $p\text{-FC}_6\text{H}_4\text{OH}$ and a compound as follows:



The Examiner will note that each of Compounds A-29, A-36, B-1, B-2, B-3, B-5, B-9 to 12 of Miura et al. have an amide group. A hydrogen bond is generally formed between the oxygen atom of the carbonyl group in the amide and the hydrogen atom of the hydroxy group in $p\text{-FC}_6\text{H}_4\text{OH}$.

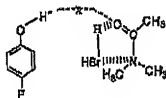
With respect to Compounds A-29 and A-36, both the amide groups are similar in that a bromine atom is bonded directly to the nitrogen atom. For example, the following hydrogen bond is formed between compound A-29 and $p\text{-FC}_6\text{H}_4\text{OH}$:



The oxygen atom of the carbonyl group has an acceptability of the hydrogen atom which depends on electron density on the oxygen atom. Generally, the lone electron pair on the right nitrogen atom of the above amide group can be shifted toward the oxygen atom by a resonance

effect. Please however note that a bromine atom is bonded to the nitrogen atom in compound A-29. It is well known in the art that a bromine atom withdraws electrons strongly. This results in the lone electron pair on the nitrogen atom in compound A-29 being strongly withdrawn to the bromine atom. The lone electron pair is not shifted toward the oxygen atom of the carbonyl group and therefore the oxygen atom has substantially no acceptability of the hydrogen atom. The case is the same as compound A-36. It is my opinion as one of ordinary skill in the art, that these facts are easily recognized.

With respect to Compounds B-1, B-2, B-3, B-5, B-9 to 12, the Examiner will note that each compound actually has two amide groups along with HBr and Br-Br. For example, Compound B1 would have the following configuration wherein HBr forms hydrogen bond with the amide group as follows:



B-1

A hydrogen bond is formed between the oxygen atom of the carbonyl group and the hydrogen atom of HBr and therefore the oxygen atom has substantially no acceptability of the hydrogen atom of p-FC₆H₄OH. Compounds B-1, B-2, B-3, B-5, B-9 to 12 each has two amide groups in a molecule. One amide group forms a hydrogen bond with HBr and the other amide group forms a hydrogen bond with Br-Br. The oxygen atom of the other amide group also has substantially no acceptability of the hydrogen atom of p-FC₆H₄OH. The case is the same as compounds B-2, B-3, B-5, B-9 to 12. It is my opinion as one of ordinary skill in the art, that these facts are easily recognized.

Thus, compounds A-29, A-36, B-1, B-2, B-3, B-5, B-9 to 12 do not satisfy the Kf condition of Claim 1.

Since Miura et al. only disclose compounds (even generically) having the nitrogen bonded to a halogen atom, Miura et al. do not anticipate nor render obvious the claimed invention.

2) Bojora et al. and Miura et al. and the present invention of claims 12-21

Currently, claim 12 is an independent claim and claims 13-21 depend from claim 12. Present claim 12 recites as follows:

12. A photothermographic material comprising, on one side of a support, a photosensitive silver halide, a non-photosensitive silver salt of an organic acid, a reducing agent for silver ions and a binder, which is characterized by containing at least one phenol compound as the reducing agent,
a metal or metal complex of Group VIII to Group X in the periodic table of elements,
a polyhalogenated compound and
at least one compound having a hydrogen bond formation rate constant Kf that is 20-4000, and which is represented by the following formula (III):



wherein:

in the formula (III), R³¹ and R³² independently represent an alkyl group, an aryl group or a heterocyclic group, and R³¹ and R³² may be taken together to form a ring.

First, Bojora et al. and Miura et al. are silent of polyhalogenated compounds. No one skilled in the art would have been motivated to use the polyhalogenated compounds in a photothermographic material and would have predicted the advantageous effects caused by utilizing the polyhalogenated compounds before the claimed invention was made.

The Examiner states in Item 5 of the October 10, 2006 Office Action that Bojora et al. disclose a photosensitive and thermosensitive element containing sulfonyl group including that

claimed in the present claimed invention in a photothermographic material such as the preferred compound in column 3, lines 10, 30 and 65. Please note that Bojora et al. use the sulfonyl-containing compounds as an organic solvent. See Claim 1 and column 2, lines 42-53 of Bojora et al. The sulfonyl-containing compounds that can be used in Bojora et al. are compounds useful as an organic solvent. Accordingly, it is my opinion that a person skilled in the art would only have been motivated to use the sulfonyl-containing compounds as an organic solvent.

The object of the invention described in Bojora et al. is to provide improved maximum image densities and reduced exposure and processing time, i.e. acceleration of development. This is in distinction to the object of the claimed invention which is to provide a photothermographic material that can sufficiently suppress coloration of blank portions during storage in the dark after development (see page 1, lines 3-5 of the specification). Bojora et al. are silent on the suppression of coloration of blank portions during storage. The object of the claimed invention is achieved by using the sulfonyl-containing compound of formula (III) in combination with the phenol compound in a photothermographic material. No one skilled in the art reading Bojora et al. would have been motivated to use the sulfonyl-containing compound in order to improve the coloration of blank portions during storage. Also, no one skilled in the art would have predicted that use of the sulfonyl-containing compound improves the coloration of blank portions during storage before the claimed invention was made.

In Example 1 of Bojora et al., tetrahydrothiophene-1,1-dioxide is used as a sulfonyl-containing organic solvent. The amount is rather small. As is well known in the art, tetrahydrothiophene-1,1-dioxide is easy to volatilize. As such, most of the added dioxide will volatilize off during a heat development and therefore little dioxide will remain in the photothermographic material after the heat development. Therefore, the photothermographic material of Bojora et al. cannot suppress coloration of blank portions during storage in the dark. This is in distinction to the claimed invention, wherein the sulfonyl-containing compound of formula (III) remains and functions well in the photothermographic material after the heat development.

Also, Miura et al. are silent of the use of sulfonyl-containing compounds to improve the coloration of blank portions during storage. As such, Miura et al. do not compensate for the deficiencies of Bojora et al.

In view of the above, it is my opinion that the invention described in present claim 12 is not obvious based on the teachings of Bojora et al. and Miura et al.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Hisashi Mikoshiba
Hisashi MIKOSHIBA

July 6, 2007
Date